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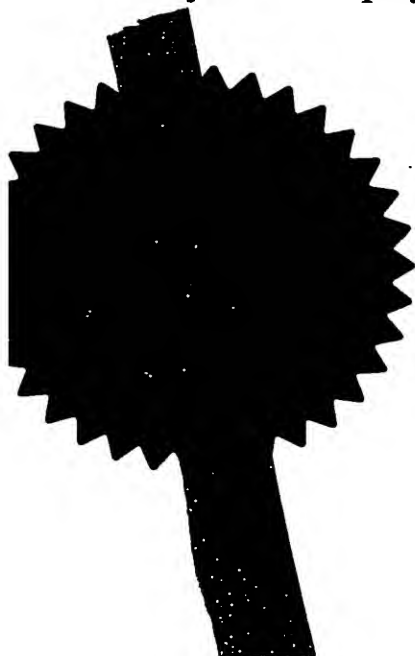
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Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference

PH/8630

2. Patent application number

(The Patent Office will fill this part in)

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31 OCT 2003 ✓

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Nokia Corporation
Kellalahdentie 4, FIN-02160, Espoo, Finland.

7652 217001

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

Finland

4. Title of the invention

Service Discovery ~~Adapted~~

5. Name of your agent (if you have one)

Address for service in the United Kingdom to which all correspondence should be sent (including the postcode)

Swindell & Pearson

48 Friar Gate
Derby
DE1 1GY

Patents ADP number (if you know it)

00001578001 ✓

6. Priority: Complete this section if you are declaring priority from one or more earlier patent applications, filed in the last 12 months.

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. Divisionals, etc: Complete this section only if this application is a divisional application or resulted from an entitlement dispute (see note d)

Number of earlier UK application

Date of filing
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8. Is a Patents Form 7/77 (Statement of inventorship and of right to grant of a patent) required in support of this request?

Yes

Answer YES if:

- a) any applicant named in part 3 is not an inventor, or
- b) there is an inventor who is not named as an applicant, or
- c) any named applicant is a corporate body.

Otherwise answer NO (See note d)

Patents Form 1/77

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Accompanying documents: A patent application must include a description of the invention. Not counting duplicates, please enter the number of pages of each item accompanying this form:

Continuation sheets of this form

Description

6

Claim(s)

3

Abstract

0

Drawing(s)

2

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for a preliminary examination and search (Patents Form 9/77)

Request for a substantive examination (Patents Form 10/77)

Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature(s)

Swindell & Pearson

Date 31/10/03

12. Name, daytime telephone number and e-mail address, if any, of person to contact in the United Kingdom

Mr. P. Higgin - 01332 367051

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Notes

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Aug 03

Patents Form 1/77

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DUPLICATE

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Service Discovery

Embodiments of the present invention relate to methods, devices, systems and software for discovering the service offered by one device to another.

5

When a user of a first Bluetooth device wishes to obtain access to a service offered by a local device, the first Bluetooth device initiates an inquiry procedure to discover which devices are in range. The Bluetooth devices within range respond with an inquiry response including their Bluetooth

10 Device Address. The first Bluetooth device then starts the Service Discovery Protocol (SDP). It interrogates the other devices to determine if any of them are candidates for providing a required service. The other devices that do provide the required service reply with an indication of the services that are provided and the protocols that are used. The first Bluetooth device then

15 makes a connection, in turn, to each of the candidate devices that provide the required service and uses the connection to request the device's user-friendly name. A candidate list of user friendly names is then displayed to the user of the first device, who can make an informed selection of which device should be used to provide the required service.

20

A problem arises because the process of connecting to each candidate device to request its user-friendly name is time consuming. Each connection requires a page which can take up to 2.5 seconds.

25 It would therefore be desirable to reduce the time taken to acquire the user-friendly names of candidate devices.

However, finding a solution to this problem is not a simple matter as the solution must be substantially compliant with the Bluetooth Specification.

30

Various embodiments of the invention are defined in the appended claims.

Embodiments of the invention combine service discovery with name request, so that the name request occurs before connection.

5 The whole selection process can be speeded up by approx. 2.5 seconds per device.

For a better understanding of the present invention reference will now be made by way of example only to the accompanying drawings in which:
10 Fig. 1 illustrates a Bluetooth piconet including a master device (M) and slave devices (S);
Fig 2 illustrates the process that occurs in the Application Host; and
Fig 3 illustrates the process that occurs in the Application Client.

15 The users of interactive applications e.g. multi-player game applications, chat over Bluetooth etc and applications with real-time elements are particularly sensitive to latencies in initiating the application. Embodiments of the invention therefore are particularly useful in setting up multi-user interactive application. However, the invention may be used in conjunction with other applications.

20 In a multi-user interactive scenario, each user has a mobile device such as a mobile telephone and each device runs the same interactive application software. Generally any device can act as the host of the application.

25 The interactive application software defines a special service record/UUID unique to that application and defines an attribute within that special service record that is used, in an application client, for storing the user-friendly name of the client device or its user.

30 Initialising Application Host

3

1) A first user of a first Bluetooth device starts the interactive application software.

2) The first user selects option "serve as Application Host"

5

3) The interactive application software enters a Host mode and the first device, which is now an Application Host, disables page scan and inquiry scan

10 4) The Application Host starts the inquiry procedure. During inquiry, the Application Host stores the received Bluetooth Device Addresses (BD_ADDR) as a candidate list.

Initialising Application Client

15

a) A second user of a second Bluetooth device starts the interactive application software. The interactive application software enters a Client mode and the second device, is now an Application Client.

20 b) The Application Client registers the service corresponding to the interactive software application. The Application Client operates as a "Service Discovery Protocol (SDP) server". SDP is described in "Specification of the Bluetooth System", v1.0B, December 1st 1999, the contents of which are herewith incorporated by reference.

25

The "SDP server" stores a database that includes service records. A new service record is created for the interactive application. The service record is associated with the UUID defined by the software of the application.

30 The "SDP server" will send this service record to any "SDP client" that searches for a service using the defined UUID.

4

The service record includes a number of attributes. One of the attributes is for a user friendly name identifying the second device or the second user. The Application Client may allow a user to specify the user friendly name via a user input device. As a default the Bluetooth device name may be used. The attribute that contains the user friendly name is defined by the application software.

The defined attribute may be one that is normally used for another purpose but in this situation is used to store the user friendly name. For example, the "ServiceName" attribute may be used. The ServiceName attribute is always in every service record, as it's a mandatory attribute, so it can easily be re-used to store the user-friendly name. Alternatively, the defined attribute may be a newly defined additional attribute.

As the Application Host and Application Client are controlled by the same software, they will both know the defined UUID and the defined attribute.

e) The Application client then enables and performs page scan and inquiry scan. The Application Client will respond to any incoming inquiry.

Service Discovery Protocol

The Application Client replies to the inquiry of the Application Host. Other Application Clients may also reply.

6) Then, the Application Host operates as an "SDP client" and performs Service Discovery Protocol (SDP) for each BD_ADDR in the candidate list to discover a service corresponding to the interactive application in the nearby devices. The Application Host searches using a service search pattern that includes the unique UUID of the interactive application.

5

The Application Client operating as an "SDP server", responds to this search by sending the service record for the interactive application. This service record includes the defined attribute that specifies the user friendly name. The Application Client then waits for an incoming connection request

5

The Application Host receives the service record from a remote device only if that device supports the interactive application. So, if the Application Host receives a service record from a particular remote device during SDP it knows that particular remote device offers the service (the interactive application). If the interactive service is not supported by a remote device, the remote device is deleted from the candidate list. If the interactive service is supported by the remote device, the 'user friendly name' is extracted from the defined attribute of the received service record and stored in the candidate list.

15 The Application Host displays the revised candidate list of the 'user friendly names' of devices that support the interactive application. The first user selects the device(s) that are to be involved in the interactive software application by selecting the user friendly name(s) that are to join the interactive software application.

20

The first device then connects to the selected devices. The user's of these devices are presented with the option of joining the interactive application.

25 The first user and the users of the connected devices then operate the interactive application software e.g. they may play a multi-user game or participate in 'chat'.

30 Although embodiments of the present invention have been described in the preceding paragraphs with reference to various examples, it should be appreciated that modifications to the examples given can be made without departing from the scope of the invention as claimed. For example ...[].

Whilst endeavoring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon."

Claims

1. A method of discovering the service offered by second device using a first device, comprising:
 - 5 first device makes a service search request;
 - second device receives the service search request and sends at least a first attribute identifying a user-friendly name; and
 - first device receives the first attribute, obtains a user friendly name from the received first attribute and displays the user friendly name.
- 10 2. A method as claimed in claim 1, wherein the first device is an "SDP client" and the second device is an "SDP server".
3. A method as claimed in claim 1 or 2, wherein the first device is an
 - 15 Application Host and the second device is Application Client.
4. A method as claimed in claim 1, 2 or 3, wherein the service search request
 - 20 is a request for a first service record stored in a database of the second device.
5. A method as claimed in claim 4, wherein second device sends the
 - attributes of the requested first service record.
6. An device operable as a host of an interactive application comprising:
 - 25 means for sending a message to an other device to determine whether that other device offers a required service;
 - means for receiving a plurality of attributes in response to the message from the other device and determining a user friendly name identifying the other device from the received plurality of attributes.
- 30 7. A device operable as a client of an interactive application comprising:

8

means for creating a service record, associated with the interactive application, that includes a user friendly name identifying the device or its user.

- 5 8. A device operable as a client of an interactive application comprising:
means for creating a service record, associated with the interactive application, that includes a user definable name.
- 10 9. A device operable to send a user-friendly device name during service discovery protocol.
- 15 10. A computer program which when loaded into a processor enable an interactive multi-user application comprising:
means for defining a first service record
means for defining a first attribute
means operable to include a user-friendly device name as a first attribute of a first service record in a database
- 20 11. A computer program which when loaded into a processor enable an interactive multi-user application comprising:
means for defining a first service record
means for defining a first attribute
means operable to obtain a user-friendly device name from a first attribute of a first service record received from another device.
- 25 12. A computer program which when loaded into a processor enables an interactive multi-user application comprising:
means for defining a first service record;
means for defining a first attribute;
30 means operable, during a client mode, to include a user-friendly device name as a first attribute of a first service record in a database; and

9

means operable, during a host mode, to obtain a user-friendly device name from a first attribute of a first service record received from another device.

13. A device, method, system or software application substantially as
5 hereinbefore described with reference to and/or as shown in the accompanying drawings

14. Any novel subject matter or combination including novel subject matter
disclosed, whether or not within the scope of or relating to the same invention
10 as the preceding claims.

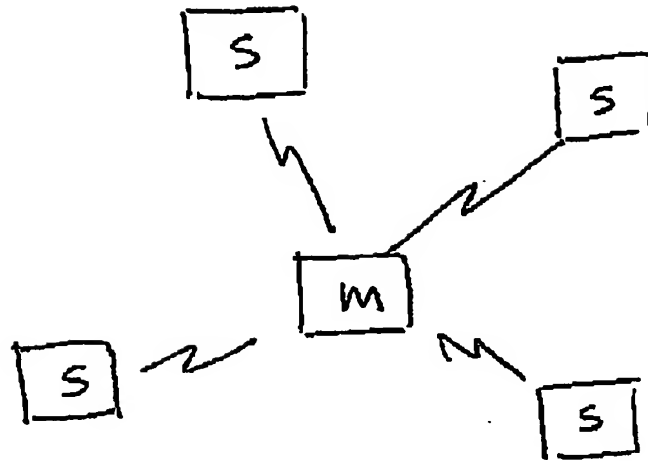


Fig. 1

Register UUID and device name for the game
Set DIAC/LIAC for inquiry scan
Enable page scan and inquiry scan.
Wait for incoming connection request
Present choice to join or cancel the incoming connection request
Disable page scan and inquiry scan

Fig. 3

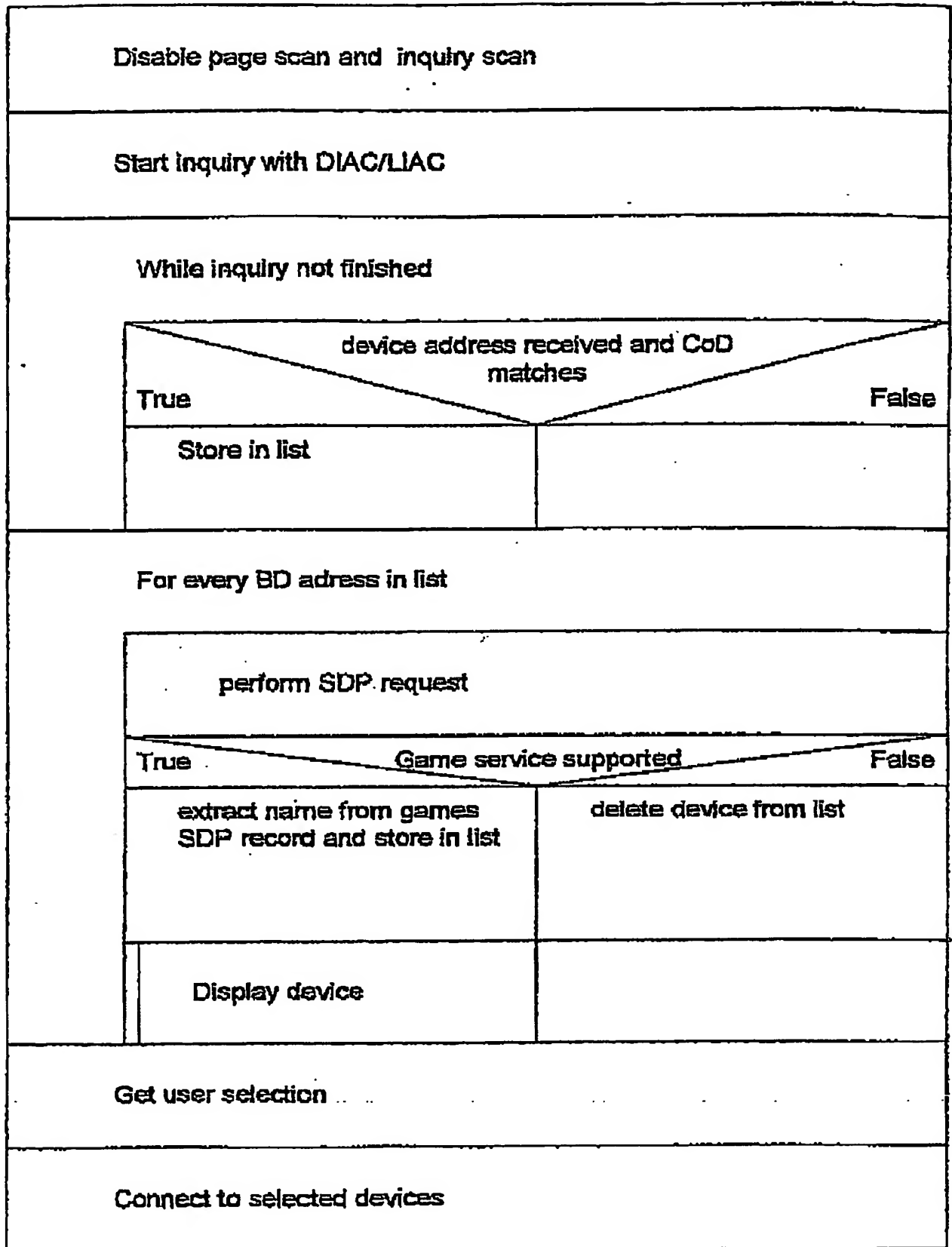


Fig 2

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